WE CLAIM:

Sub A67

1. In a digital communications system having a transmitter for transmitting information in a form of a phase shift keyed signal, said signal being divided into a plurality of windows, each said window being offset in time, and a receiver for receiving said information, a demodulator comprising:

conversion means for converting said phase shift keyed signal into a plurality of successive outputs, each said successive output being representative of a phase and amplitude of said phase shift keyed signal over additional sets of windows and carrier phases, and each said additional set having different offsets in time and carrier phase from the other said additional sets;

estimation means for using said plurality of signals to estimate said carrier phase and said window offsets of said phase shift keyed signal; and

decoding means for decoding said phase shift keyed signal back into digital data using said estimates.

2. In a digital communications system having a transmitter for transmitting information in a form of a phase shift keyed signal divided into a plurality of windows, each said window being offset in time, and a receiver for receiving said information, a method for demodulation of said phase shift keyed signal comprising the steps of:

converting said phase shift keyed signal into a plurality of successive outputs, each of which is representative of a phase and amplitude of said phase shift

keyed signal over additional sets of windows and carrier phases, each said additional set having a different offset in time and carrier phase from the other said additional sets of windows and carrier phases;

estimating the carrier phase and window offsets of said phase shift keyed signal using said plurality of successive outputs; and

decoding said phase shift keyed signal back into digital data using said estimates.

3.   A method in accordance with Claim 2, wherein a distribution of bit values received for a set of possible said window offsets and carrier phases is measured and a most likely said window offset and carrier phase are selected.

4.   A method in accordance with Claim 3, wherein said most likely said window offset and carrier phase are selected by choosing those which maximize a sum of an increasing function of an absolute value of said bit values.

5.   A method in accordance with Claim 3, wherein said most likely said window offset and carrier phase are selected by choosing those which maximize a sum of the squares of bit values.

6.   A method in accordance with Claim 3, wherein said most likely window offset and carrier phase are selected by choosing those which maximize a sum of the absolute values of said bit values.

7.   A method in accordance with Claim 3, wherein said most likely window offset and carrier phase are selected by choosing those which maximize a bit error rate.

8.   A method in accordance with Claim 3, wherein said most likely window offset and carrier phase are selected by comparing a sum of the squares of said bit values to a theoretical value.

9.   A method in accordance with Claim 3, wherein said carrier phase is tracked by calculating a sum of the squares of said bit values for a small set of candidate window offsets.

10.   A method in accordance with Claim 9, wherein said small set of window offsets is adjusted by using the measured bit values.

11.   A method in accordance with Claim 2, wherein said window offsets and carrier phase are synchronized.